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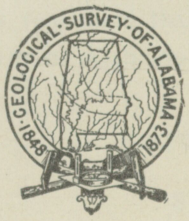
GEOLOGICAL SURVEY OF ALABAMA
WALTER B. JONES, STATE GEOLOGIST (ON LEAVE)

BULLETIN 52

FLUORIDE IN THE GROUND WATER OF THE CRETACEOUS AREA OF ALABAMA

BY

CHARLES W. CARLSTON
UNITED STATES GEOLOGICAL SURVEY



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LETTER OF TRANSMITTAL

University, Alabama
September 10, 1942

Honorable Frank M. Dixon
Governor of Alabama
Montgomery, Alabama

Sir:

I have the honor to transmit herewith the manuscript of a report entitled "Fluoride in the Ground Water of the Cretaceous Area of Alabama" by Charles W. Carlston, of the United States Geological Survey. It is requested that it be printed as Bulletin 52 of the Geological Survey of Alabama.

Respectfully,

STEWART J. LLOYD,

Asst. State Geologist.

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FLUORIDE IN THE GROUND WATER OF THE CRETACEOUS AREA OF ALABAMA*

INTRODUCTION

In June, 1940, the Geological Survey of Alabama in cooperation with the United States Geological Survey began a study of the ground water resources of the outcrop area of the Cretaceous formations of Alabama. The area studied includes all or parts of Autauga, Barbour, Bullock, Chilton, Crenshaw, Dallas, Elmore, Greene, Hale, Lamar, Lee, Lowndes, Macon, Marengo, Montgomery, Perry, Pickens, Pike, Russell, and Sumter Counties. (See plate 1.) The purpose of the study was to determine the occurrence, quality, and availability of the ground water of the area. The work was done under the supervision of V. T. Stringfield and under the general direction of O. E. Meinzer, Geologist in charge of the Division of Ground Water of the United States Geological Survey; Walter B. Jones, State Geologist; and Stewart J. Lloyd, Assistant State Geologist.

The writer gratefully acknowledges the assistance of Stewart J. Lloyd, of the Geological Survey of Alabama, and of O. E. Meinzer, V. T. Stringfield, L. W. Stephenson, Margaret D. Foster, D. J. Cederstrom, and J. C. Maher, of the United States Geological Survey, in reviewing this report and offering constructive criticism.

In the course of the field investigation a total of 162 preliminary chemical analyses and 19 complete analyses were made on samples of water from wells and springs by Margaret D. Foster and L. W. Miller, of the Quality of Water Division of the United States Geological Survey. The results are given in table 1 and the records of the wells and springs are listed in table 2.

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*Prepared under the direction of the United States Geological Survey, in cooperation with the Geological Survey of Alabama.

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Many of these analyses showed the presence of fluoride, which is generally recognized as the cause of the dental defect known as mottled enamel. Mottled enamel has been known for some time in the southern part of Barbour County, Alabama. This investigation shows a widespread presence of fluoride in waters elsewhere in the state as well as in Barbour County.

H. Trendley Dean, Dental Surgeon of the U. S. Public Health Service, has stated:

"The causative factor of mottled enamel is operative during the period of tooth development....Normally calcified teeth erupt showing a smooth, glossy, translucent structure, usually of a pale creamy white color. Teeth affected with mottled enamel, on the contrary, erupt showing a dull, chalky white appearance which in many instances later take on a characteristic brown stain, the frequency of brown stain increasing with age. In areas of marked severity, the surface of the teeth may in addition be marked by discrete or even confluent pitting. As the enamel forming organisms...cease functioning at the time of the eruption of a tooth, mottled enamel is a permanent physical disfigurement."[1]

As Dean[2] points out, mottled enamel is at times observable on the first or deciduous teeth of children in regions of medium to marked severity of mottled enamel. However, the most important manifestation of mottled enamel is on the permanent teeth and results from drinking water that contains toxic quantities of fluorine during the time of development of the permanent teeth. The use of water high in fluoride has no effect upon the teeth of adults. Only children under eight years of age are susceptible to this dental defect. Once mottled enamel is established in the tooth structure, however, there is no known cure and the effect is permanent.

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[1]Dean, H. T., Chronic endemic dental fluorosis: The Journal of the American Medical Association, vol. 107, p. 1269, October 17, 1936.

[2]*Ibid.*, p. 1269.

According to Dean,

"From the continuous use of water containing about 1 part per million, it is probable that the very mildest forms of mottled enamel may develop in about 10 per cent of the group. In waters containing 1.7 or 1.8 parts per million, the incidence may be expected to rise to 40 or 50 per cent, although the percentage distribution of severity would be largely of the 'very mild' and 'mild' types. At 2.5 parts per million an incidence of about 75 to 80 per cent might be expected, with possibly 20 to 25 per cent of all cases falling into the 'moderate' or a severer type. A scattering few may show the 'moderately severe' type.

"At 4 parts per million the incidence is, in general, in the neighborhood of 90 per cent, and as a rule 35 per cent or more of the children are generally classified as 'moderate' or worse. In concentrations of 6 parts per million or higher an incidence of 100 per cent is not unusual."[3]

There are, fortunately, beneficial effects of water containing low amounts of fluoride. Dean has summarized this aspect of the problem of fluoride-carrying waters as follows:

"Endemic dental fluorosis is notable among the major dental diseases as the only one whose prevention has been acceptably demonstrated. But epidemiological observations made during the course of these studies shed such important light on the enigma of dental decay (dental caries) that the original investigation is often lost sight of. During the past few years numerous groups in different fields of science have been engaged in the study of the fluorine-dental caries hypothesis, namely, that certain amounts of fluorides are necessary in order that human teeth shall not decay. Fundamental findings have already been brought to light, findings that hold unusual promise of markedly curtailing this ubiquitous affliction, tooth decay..... It has been shown epidemiologically that school children using domestic waters containing as little as about one part per million of fluorine experience only half to a third as much dental decay as comparable groups using fluoride-free water, such as the Lake Michigan or the Mississippi River waters. Very

[3] *Ibid.*, p. 1272.

recently confirmation of this inverse relationship has come from England, Northern India, and South Africa.

"Biochemical studies demonstrate that the enamel of caries-free teeth contains about twice as much fluorine as the enamel of carious teeth. Bacteriological studies of oral lactobacilli made on several thousand children in conjunction with the epidemiological studies disclosed that the percentage of high and low counts closely reflected the markedly different caries prevalence rates of the fluoride and fluoride-free communities. A number of independent investigators report a conspicuous reduction in the production of rat molar caries when fluorine is added to the caries-producing diet. Apparently teeth require traces of fluoride for optimum dental health, although excessive amounts may result in the disfiguring condition known as mottled enamel. The difference between 0.0 and 1.0 part per million of fluoride (F) in the domestic water supply has been shown to be highly significant from the standpoint of the amount of dental decay in a community."[4]

In this investigation fluoride in excess of one part per million was found exclusively in water from deep wells. Throughout much of the area covered by this study water from deep wells represents the chief source of supply for domestic use and public supplies. The areas where water from such wells contains harmful amounts of fluoride are of considerable size. Five public supplies delivering water with more than one part per million of fluoride were found. It is therefore considered advisable to prepare this report on the fluoride waters of the Cretaceous in advance of a more comprehensive report on the ground water resources of the Cretaceous.

The report consists of a discussion of the geologic occurrence of fluoride water and possible modes of origin of fluoride in the artesian water, with special reference to the occurrence of fluoride water in the Cretaceous area of Alabama. In areas where fluoride reaches harmful concentration in water now in use, sources of

[4]Dean, H. T., Fluorine and dental health: Am. Assoc. Advancement Sci. Bull., Vol. 1, p. 47, August, 1942.

ground water free from fluoride are described. It should be noted, however, that treatments for the reduction of fluoride in water have been devised, and at least one commercial fluoride removal system is now on the market.

UPPER CRETACEOUS GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

The following tables represent the Upper Cretaceous formations of west-central and eastern Alabama. The geologic information supplied in the tables and in the following section is mainly obtained from the publications of Stephenson and Monroe.[5]

Upper Cretaceous formations of west-central Alabama

Formation	Estimated thickness (feet)	Character
Prairie Bluff chalk	80	Chalk with local sandy lenses. Yields a little water to shallow wells.
Ripley formation	100-200	In Sumter County a highly calcareous sand and sandstone. Yields a little water to shallow wells. East of Sumter County sand and clay. A source of artesian water.
Selma chalk		
Demopolis member	490	Massive chalk. Yields a little water to shallow wells.
Arcola limestone member	5-15	Pure limestone interbedded with chalk.
Lower marly member	265-350	Marly chalk and chalky marl. Yields a little water to shallow wells.
Eutaw formation	400	Upper 100 feet (Tombigbee sand member) massive glauconitic sand. Yields fair quantities of water. In many areas water is high in fluoride. Lower 300 feet sand and clay. Important source of artesian water. In many areas water is high in fluoride.
Tuscaloosa formation	1000	Gravel, sand, and clay. Important source of water to deep artesian wells. Water low in mineral content.

[5]Stephenson, L. W. and Monroe, W. H., Stratigraphy of Upper Cretaceous series in Mississippi and Alabama: Bull. Am. Assoc. Petrol. Geol., Vol. 22, No. 12, pp. 1639-1657, 1938.

Monroe, W. H., Notes on deposits of Selma and Ripley age in Alabama: Ala. Geol. Survey Bull. 48, 1941.

Upper Cretaceous formations

along the west side of the Chattahoochee River

Formation	Estimated thickness (feet)	Character
Providence sand	140	Sand and clay. In outcrop area yields water to dug wells and a few deep artesian wells. Water reported to carry fluoride in one area.
Ripley formation	300-400	Marine sand. Yields water to shallow wells and deep artesian wells. Water contains fluoride in places.
Cusseta sand	265	Sand and clay. Yields water to shallow wells and deep artesian wells.
Blufftown formation	380	Sand and clay, with gravel and sandstone at base. Yields water to shallow wells and deep artesian wells. Water contains fluoride in places.
Eutaw formation	100-200	Sand and clay with indurated ledges. Yields water to shallow wells and deep artesian wells. Water contains fluoride in places.
Tuscaloosa formation	500-600	Gravel, sand, and clay. Yields water to shallow wells and deep artesian wells.

West-central Alabama

In west-central Alabama the lowermost of the Coastal Plain beds, the Tuscaloosa formation, consists of about 1000 feet of irregularly bedded multicolored gravel, sand, and clay. The Tuscaloosa formation in Alabama is principally continental in origin, or stream deposited, and as a result contains none of the phosphatic material which is apparently one of the chief sources of fluoride in ground water of the Cretaceous area. High yields of water are obtained from the Tuscaloosa formation. The water is generally low in total mineral content but is in many places high in hydrogen sulphide and iron. The Eutaw formation overlies the Tuscaloosa and consists of about 300 feet of glauconitic sand and clay, which grades upward into about 100 feet of massive glauconitic sand known as the Tombigbee sand member. High yields of water are obtained from the Eutaw formation, especially from its lower part. The water is generally soft but high in sodium bicarbonate content and in certain areas it contains high amounts of chloride. Most of the well waters in the Cretaceous area which were found to contain fluoride came from the Eutaw formation in western and central Alabama. The Selma chalk, which overlies the Eutaw, consists of the lower marly member, 265 feet thick; the Arcola limestone member, 5 to 15 feet thick; and the Demopolis member, about 490 feet thick. The Ripley formation overlies the Demopolis member of the Selma chalk. It is about 100 to 200 feet thick and a highly calcareous micaceous sand and sandstone in Sumter County and sand and clay east of central Marengo County. The Ripley formation is overlain by the uppermost formation of the Cretaceous, the Prairie Bluff chalk, which is about 80 feet thick.

Eastern Alabama

Throughout central and eastern Alabama extensive changes in the character of the Upper Cretaceous formations occur along the strike, with the result that the stratigraphic column of eastern Alabama contrasts strongly with the column for west-central Alabama.

The Upper Cretaceous formations which outcrop along the Alabama side of the Chattahoochee River consists of the Tuscaloosa formation, the Eutaw formation, the Blufftown formation, the Cusseta sand, the Ripley formation, and the Providence sand.

The Tuscaloosa formation is about 500 to 600 feet thick in eastern Alabama. It consists of multicolored irregularly bedded gravel, sand, and clay. The Eutaw formation, overlying the Tuscaloosa, consists of only the Tombigbee sand member east of Tuskegee, Alabama, and is from 100 to 200 feet thick. The Blufftown formation overlies the Eutaw and consists of about 265 feet of cross-bedded coarse-to-fine-grained sand with intercalated clay lenses. The Ripley formation, overlying the Cusseta sand, consists of 300 to 400 feet of marine sands. Overlying the Ripley formation is the Providence sand, which consists of about 140 feet of irregularly bedded sands with interbedded clays.

SOURCE OF THE FLUORIDE IN WATER OF THE EUTAW FORMATION

Water from deep wells which penetrate the Eutaw formation is generally soft and high in bicarbonate. As water in the sands of the Eutaw moves southward down the dip of the formation the sodium bicarbonate content increases progressively, while the hardness remains about the same or decreases to some extent. This suggests that carbon dioxide in the ground water entering the formation continues to react with calcium and magnesium carbonates in the water sands to form bicarbonates of calcium and magnesium as the water moves down the dip. These bicarbonates are immediately reacted upon by base exchange silicates that give up sodium in exchange for calcium and magnesium. This slow but continuous process results in ever increasing amounts of sodium bicarbonate in the water.

In Florida phosphatic pebbles in the Hawthorn formation are indicated to be the source of fluorides found in some of the ground waters of that state.[6] Maher, who reported on the occurrence of fluoride water in Avoyelles and Rapides Parishes, Louisiana,[7] has suggested volcanic ash and bentonite as one of the sources of fluoride in ground water in Louisiana.[8]

A recent paper by George R. Mansfield[9] suggests a significant clue to the origin of the fluoride in the water of the Eutaw formation. Mansfield states that fluorine is required to make phosphate insoluble and thus insure its preservation through geological ages. He points out that the principal phosphate deposits of the United States were formed during periods of extensive volcanic activity when volcanic debris was deposited in or near the regions of phosphate accumulations. The volcanic debris would furnish large quantities of fluorine to the phosphate deposits. Mansfield gives evidence of widespread volcanic activity in the Upper Cretaceous and tells of bentonite beds of this age in the Upper Cretaceous of Mississippi, Alabama, Louisiana, and Texas. He then points out

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[6]Black, A. P., Stearnes, T. W., McClane, H. H., and McClane, T. K., Fluorine in Florida waters: Mimeographed reprint, Florida section, Proceedings of the Ninth Annual Convention of Amer. Waterworks Assoc., pp. 22-23, 1935.

[7]Maher, J. C., Fluoride in the ground water of Avoyelles and Rapides Parishes, Louisiana: Louisiana Dept. Cons. Geol. Pamphlet No. 1, 23 pp.

[8]Maher, J. C., Personal communication.

that phosphate beds of Upper Cretaceous age occur in Mississippi and Alabama.

According to Eugene Allen Smith[10] phosphates occur at the top of the Eutaw. The phosphatic material extends 40 feet below the top of the formation, although the richest phosphates are located within the top 12 feet of the formation where the phosphoric acid is said to reach an average of 4.6 percent. According to W. H. Monroe[11] of the United States Geological Survey the top 5 feet or so of the phosphatic sands discussed by Smith as of Eutaw age are really basal Selma in age. They also occur at several other stratigraphic positions in the Upper Cretaceous.[12]

There appears to be a direct correlation between increase in bicarbonate content and increase in fluoride content, as shown in figure 1, where the fluoride content of samples of water from 75 wells is plotted against the bicarbonate content. That most of the 75 samples contained less than 60 parts per million total hardness is illustrated in figure 2.

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[9]Mansfield, G. R., The role of fluorine in phosphate deposition: Am. Journal Science, Vol. 238, pp. 863-879, 1940.

[10]Smith, E. A., and others, Report on the geology of the Coastal Plain of Alabama: Alabama Geol. Survey, pp. 445-475, 1894.

Smith, E. A., The phosphates and marls of Alabama: Am. Inst. Min. Eng. Trans., Vol. 25, pp. 819-820, 1895.

[11]Monroe, W. H., Oral communication.

[12]Stephenson, L. W., Oral communication.

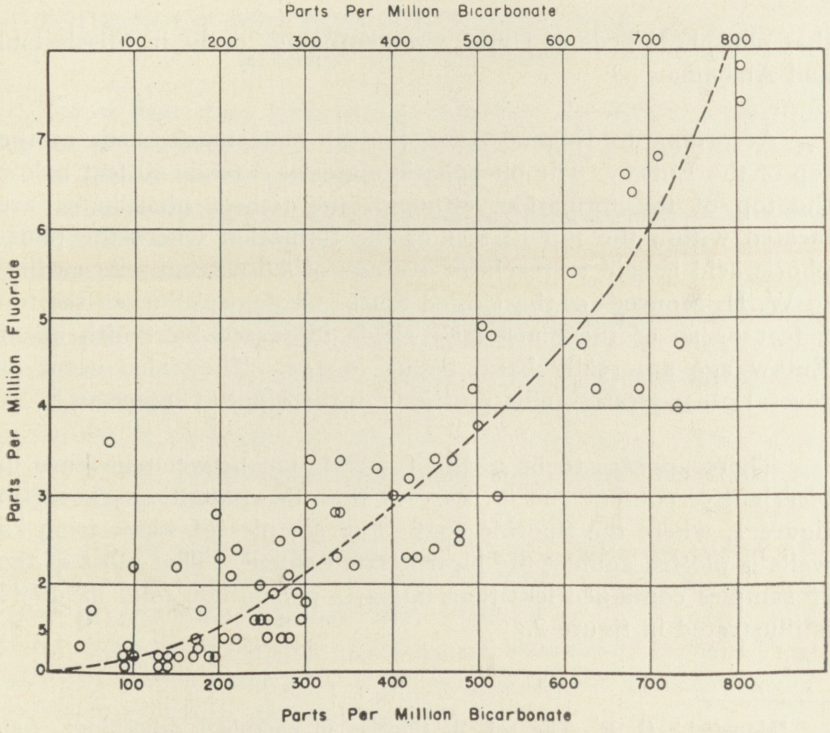

Figure 1. Graph showing relation of fluoride to bicarbonate in 75 analyses of water from the Eutaw formation.

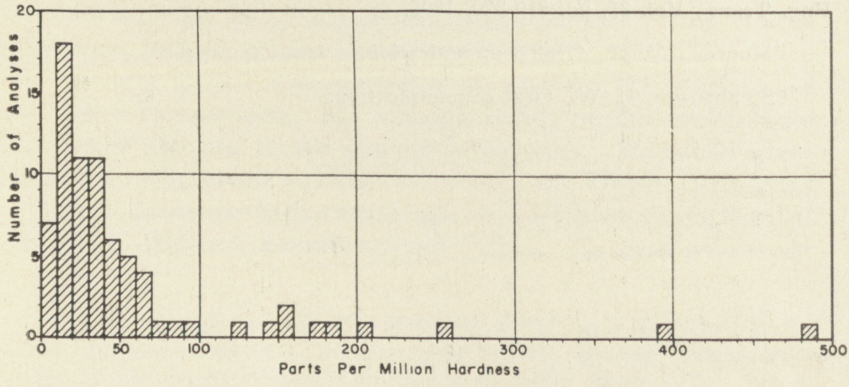

Figure 2. Total hardness of 75 samples of water from the Eutaw formation containing 0.1 part per million of fluoride or more.

The increase in fluoride with increase in bicarbonate suggests that the same material which causes base exchange may be contributing fluoride to the ground water or that the general relation of high fluoride to high bicarbonate may simply be due to the length of time that the ground water is in contact with two different materials. Increase in bicarbonate as the water moves through the formation may be accompanied by increase in fluoride as the water remains in contact for a longer time with material contributing fluoride to the water.

Phosphates have been convincingly demonstrated to contain fluoride as a secondary product derived from volcanic material. Phosphate occurs at the top of the Eutaw throughout Alabama and bentonite has been discovered in the upper Eutaw near Montgomery, Alabama, by Walter B. Jones.[13] High fluoride water in the Eutaw is mainly restricted to the central and western parts of the Cretaceous, although some fluoride water comes from the Eutaw of eastern Alabama. High fluoride waters are therefore apparently not coextensive with the phosphates. It is nevertheless quite possible that careful study of the Eutaw phosphates would disclose the greatest amounts of phosphate up the dip from the high fluoride waters of the Eutaw. It is also possible that, down the dip from the outcrop area of the Eutaw, phosphates may be present in greater amounts where fluoride concentrations are highest in the ground water. Inasmuch as phosphate and volcanic material are known to contain fluoride and these are the only fluoride carrying materials known to exist in the Eutaw of Alabama, there is strong evidence that the phosphates and possibly volcanic material of the upper Eutaw are the agents contributing fluoride to the Eutaw ground water.

One test of this hypothesis would be discovery of greater amounts of fluoride in the upper Eutaw water than in the middle and lower Eutaw water. If the reverse were true some other agency than the phosphates and ash of the upper Eutaw would be suggested as the cause of the fluoride. Three localities were found where wells in one small area obtain water from the upper and the middle or lower Eutaw. These localities are Geiger, Sumter

[13]Oral communication from Walter B. Jones.

County; Faunsdale, Marengo County; and Linden, Marengo County. At Geiger and Faunsdale upper Eutaw water contains more fluoride than water from the middle or lower Eutaw (see wells 2 and 3 of Sumter County and 5 and 6 of Marengo County in tables 1 and 2). At Linden waters from the upper and from the middle Eutaw contain the same amount of fluoride.

Glauconite, a complex silicate of potassium and iron which is fairly abundant in the Eutaw sands, may be chiefly responsible for the softening of Eutaw ground water. Leverrierite, a constituent of bentonite possibly present in these sands, may also aid in the process of base exchange.

According to Renick,

"Bentonite, though containing more than one mineral, always consists chiefly of leverrierite, or one of the group of micaceous clay minerals which includes the mineral commonly known as leverrierite. This group possesses the property of readily exchanging its bases and is considerably more reactive than the ordinary natural clays."[14]

[14]Renick, B. C., Base excharge in ground water by silicates as illustrated in Montana: U. S. Geol. Survey W.S.P. 520, p. 68, 1924.

OCCURRENCE OF FLUORIDE IN WATERS OF THE CRETACEOUS FORMATIONS

Fluoride in water of the Eutaw formation

Western Cretaceous area.—

Fluoride water occurs in the Eutaw formation in four areas. The first of these is in the western part of the region in which Cretaceous formations crop out. This area includes all of Sumter and Marengo Counties and parts of Greene and Dallas Counties. Fortunately it is possible to obtain water free from fluoride by boring deeper to obtain Tuscaloosa water. Use of water from shallow dug wells or cisterns is also a possible means of obtaining water that does not contain harmful amounts of fluoride. Such shallow wells should be located far from any possible source of pollution and should be constructed and maintained under proper sanitary supervision.

The water of the public supply of Eutaw, Greene County, is obtained from well 7, which is 306 feet deep and penetrates the lower part of the Eutaw formation. This water contains 2.4 parts per million of fluoride and 405 parts per million of chloride. However, a private well 500 feet deep on the southwest edge of Eutaw (well 40) obtains from the Tuscaloosa formation water that contains 69 parts per million of total hardness, 4 parts per million of chloride, and no fluoride. It therefore appears that if the municipal well were drilled deeper to the Tuscaloosa formation, a supply could be obtained from the Tuscaloosa at a depth of from 500 to 600 feet. An analysis of water from a dug well in the center of town (well 39) shows 63 parts per million of total hardness, 78 parts per million of chloride, and no fluoride. This suggests that small domestic supplies free from fluoride may be obtained from shallow wells.

At Demopolis and at Faunsdale in Marengo County samples of water from deep wells (3, 4, and 5) which are the source of the public supplies contained 1.3 parts per million of fluoride. If this amount of fluoride proves harmful to children's teeth it is possible that Demopolis could obtain water from the Tuscaloosa formation

by drilling wells through the Eutaw into the Tuscaloosa. Small supplies from shallow wells, as suggested for Eutaw, would be difficult to obtain because the chalk which underlies the surface at Demopolis yields very little water to wells. At Faunsdale conditions are similar to those at Demopolis and wells which penetrate the Tuscaloosa formation might provide a satisfactory supply.

Samples of water from the deep wells (9, 10, and 13) which penetrate the Eutaw formation and are the sources of the public supplies of Linden and Thomaston in Marengo County contained 3.2 parts per million of fluoride. Wells drilled through the Eutaw to the Tuscaloosa formation may yield water free from fluoride, but at that depth the water may be relatively highly mineralized. In Linden wells 20 to 30 feet deep yield water low in fluoride, although the water is relatively hard. (See analyses for wells 11 and 12.) Logs of wells 9 and 10 at Linden show sands at a fairly shallow depth that may be explored as an alternative source of water low in fluoride or free from fluoride. The log of well 9, which is 1,080 feet deep, shows 15 feet of sand from 40 to 55 feet, and the log of well 10, which is 1,245 feet deep, shows 44 feet of sand from 20 to 64 feet and 10 feet of sand from 75 to 85 feet. At the outcrop this sand is coarse, well graded, and has the characteristics of a productive water sand. It is possible that a similar sand may be found at shallow depths at Thomaston. Analysis of a sample of water from a well 25 feet deep (well 14) at Thomaston shows 57 parts per million of hardness, 34 parts per million of chloride, and only 0.1 part per million of fluoride. Shallow wells at Thomaston should therefore provide a satisfactory water low in fluoride for the use of children.

The public well (1) at Livingston, Sumter County, contains 1.8 parts per million of fluoride. However, this well is not used as a general public supply.

Lowndes County—Montgomery County area.—

This area extends eastward from eastern Lowndes County through the western third of Montgomery County. Its exact western limit is unknown because the Eutaw waters in the western two-thirds of Lowndes County are too salty for human consumption, resulting in the almost complete use of Tuscaloosa water in this area. Eutaw water containing high amounts of fluoride has been found in this investigation nearly as far west as Lowndesboro in the northern part of the county and as far west as Letohatchee in the southern

part of the county. A few available analyses of water from the Eutaw formation in the northwest corner of the county do not show high fluorides. As may be noted in the table of analyses and on plate 1 the water with the highest fluoride in all the Cretaceous area is from wells in the eastern part of Lowndes County. The maximum fluoride content (6.8 parts per million) was found in water from a well 2½ miles southeast of Letohatchee.

There is no public supply at Letohatchee. Most of the wells in the town are from 700 to 765 feet in depth and yield water from the Eutaw formation. A sample of water from well 24, which appears to be representative of the wells in Letohatchee, had a fluoride content of 6.4 parts per million. It is expected that a well drilled to the underlying Tuscaloosa formation would yield water similar to that of the public supply at Hayneville, which has only 0.2 parts per million of fluoride, 15 parts per million of hardness, a low chloride content (91 parts per million), and a low bicarbonate content (129 parts per million). Small domestic supplies free from fluoride might be obtained from shallow wells.

Throughout the area waters of low fluoride content may be obtained from deep wells to the Tuscaloosa formation and from shallow wells.

Barbour County area.—

The only analysis of water from the Eutaw formation in the eastern part of the state which showed a high fluoride content was that for a sample from a well 385 feet deep (well 19) in the northwest part of Barbour County which contained 2.6 parts per million of fluoride. In this area the Blufftown formation, which overlies the Eutaw, and the Tuscaloosa formation, which underlies the Eutaw, do not apparently contain large amounts of fluoride and therefore appear to be satisfactory sources of supply for water low in fluoride or free from fluoride.

Fluoride in water of the Tuscaloosa formation

Water in the Tuscaloosa formation rarely contains harmful amounts of fluoride and so presents little difficulty in this respect. However, a few samples of water from the Tuscaloosa contained fluoride.

One of the wells in the City of Montgomery well field yields water containing 1.0 part per million of fluoride. This water is derived from a sand of the Tuscaloosa formation 587 to 613 feet deep. A sample of water from Eutaw sends 138 to 178 and 181 to 214 feet deep had only 0.2 parts per million of fluoride and a water sample from river alluvium sands 50 to 81 feet deep had no fluoride. Mixture of water from these sands apparently produces a public supply of much less than 1.0 part per million of fluoride.

Kilby State Prison, three miles northeast of Montgomery, has a well 600 feet deep which yields Tuscaloosa water containing 1.4 parts per million of fluoride. As this is a relatively low amount of fluoride and waters from Eutaw sands and shallower Tuscaloosa sands in this area do not contain harmful quantities of fluoride, no acute fluoride problem is present here.

Water from well 2 in Eufaula, Barbour County, which was reported to be 1,200 feet deep and to be cased to the bottom, has a fluoride content of 1.4 parts per million. According to this information the well yields water from the Tuscaloosa formation if the casing extends unbroken to the bottom of the hole. Similarity of the preliminary analysis of water from this well to analyses of water from wells drawing upon the Ripley formation in the town suggests that this well yields some water from the Ripley formation.

Fluoride in water of the Blufftown formation

A well at Pittsview, Russell County, yields Blufftown water which contains 1.2 parts per million of fluoride. This is the only analysis of Blufftown water which shows more than 1.0 part per million of fluoride. As all the wells in Pittsview penetrate the same water sands as this well, it is quite possible that most of the water used in this town contains more than 1.0 part per million of fluoride. Three analyses of Eutaw well waters elsewhere in Russell County failed to show more than 0.9 part per million of fluoride. It therefore appears that if this amount of fluoride is harmful to the teeth of the town's children any well in town could be drilled deeper to the underlying Eutaw formation in order to obtain ground water low in fluoride or free from fluoride. Dug wells might yield water free from fluoride.

Fluoride in water of the Ripley formation

Samples of water were collected from two artesian wells at Eufaula, Barbour County, which yield water from the Ripley formation. Both samples contained 1.0 part per million of fluoride. There are very few deep wells in Eufaula due to a satisfactory public water supply obtained from a surface source. It is possible, however, that private wells outside the town are using high fluoride water from the Ripley and that Ripley water down the dip, or south of this area, may be high in fluoride. This will be investigated during future work on the Tertiary formations of Barbour County.

SUMMARY

Waters carrying high amounts of fluoride cause the dental defect known as mottled enamel. Waters containing low amounts of fluoride have been known to help prevent dental decay. Fluoride occurs in water from some deep wells in the Tuscaloosa, Eutaw, Blufftown, and Ripley formations of Upper Cretaceous age in Alabama. Most of the wells which yield water with harmful amounts of fluoride are in the Eutaw formation. Only a few wells yield water with more than one part per million of fluoride from the Tuscaloosa, Blufftown, and Ripley formations. Water from the Eutaw formation that is high in fluoride is generally very low in total hardness and high in bicarbonate content. The fluoride in solution may be derived from fluoride in phosphate and volcanic ash deposits present in the upper part of the formation. In areas where the ground water contains harmful quantities of fluoride it is generally possible to obtain water free from fluoride, or very low in fluoride content, by drilling to an underlying formation or, in some cases, by the use of water from shallow wells.

TABLE 1

Analyses of water from wells and springs in the Cretaceous Area of Alabama

Analyzed by Margaret D. Foster and L. W. Miller. Parts per million.

See table 2 for records of wells. The well numbers are the same as those in table 2 and plate 1.

Autauga County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1	T. O. McDowell	Oct. 29, 1940								32	3	2	0.4		21
8	Crystal Lake Broom Works	Oct. 29, 1940								11	1	1	.1		7.5
17	Prattville Cotton Mills	Oct. 24, 1940								46	3	2	.7		27
19	Mrs. J. Alexander and Mrs. Kate Wadsworth	Oct. 24, 1940								10	1	1	.6	0.0	10
24	C. C. and L. E. Kirkpatrick	Oct. 24, 1940								6	1	2	.6		10

TABLE 2

Records of wells and springs listed in table 1

Abbreviations: Dom., domestic; Ind., industrial; Obs., observation. Numbers designating the wells are the same as those in table 1.

Autauga County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Ala. state road 14, .4 mile from Dallas County line, south side of road.	T. O. McDowell	Jetted	150	4		Tuscaloosa	Dom. and stock	Preliminary analysis. Slight H_2S odor suggests Tuscaloosa water.
8	Autaugaville, Ala.	Crystal Lake Broom Works	Jetted	320	4	320	Tuscaloosa	Ind.	Preliminary analysis.
17	Prattville, Ala.	Prattville Cotton Mills	Jetted	300	4		Tuscaloosa	Ind.	Preliminary analysis.
19	Prattville, Ala.	Mrs. J. Alexander and Mrs. K. Wadsworth	Jetted	94	2	60	Eutaw	Dom.	See Smith, page 217, J. C. Burns well. Original water level 20 feet above land surface. Preliminary analysis.
24	Prattville, Ala.	C. C. and L. E. Kirkpatrick	Jetted	193	2	193	Eutaw	Dom.	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Barbour County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
2	Eufaula Ice and Coal Co.	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	451	3	22	1.4	.....	16
3	Eufaula Live Stock Market	Jan. 24, 1941	290	15	.13	4.4	.6	110	4.0	289	2.3	9.8	1.0	.55	14
5	Eufaula Brick Co.	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	349	1	13	1.0	.....	12
9	Freeman Strickland	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	6	1	58	0	52	48
12	S. J. Dismuke	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	214	20	13	0	.....	28
19	A. R. Trammel	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	68	20	66	2.6	.....	26
22	A. L. Sylvester	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	205	7	2	0	.....	140
30	Eufaula Rotary Club	Jan. 24, 1941	.....	.....	.....	.....	.....	.....	.....	49	300	96	.7	.....	54

Bullock County

2	City Waterworks	Jan. 24, 1941	158	10	0.07	2.2	0.1	54	1.8	115	22	6.0	.2	0.53	5.9
35	K. S. Houston	Nov. 15, 1940	.....	.....	.....	.....	.....	.....	.....	18	1	18	0	73	82
40	G. A. Main	Nov. 15, 1940	.....	.....	.....	.....	.....	.....	.....	212	22	2	0	.....	159

TABLE 2—Continued

Records of wells and springs listed in table 1

Barbour County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
2	Eufaula, end of South Orange St., behind plant.	Eufaula Ice and Coal Co.	Drilled	1200	6	1200	Tuscaloosa	Emergency	Preliminary analysis.
3	Eufaula, west of intersection Ala. 6, U.S. 241, behind plant.	Eufaula Live Stock Market	Jetted	320	4	120	Ripley	Stock yards	Complete analysis.
5	Eufaula, 1 mile south of railroad station in brick yard.	Eufaula Brick Co.	Jetted	350	4	20	Ripley	Ind.	Preliminary analysis.
9	Farm 1.8 miles southwest of Chance store.	Freeman Strickland	Dug	39.6			Providence sand	Dom. and stock	Preliminary analysis.
12	Comer, first house east of station in barnyard.	S. J. Dismuke	Jetted	135	4		middle Blufftown	Stock	Strong H_2S odor and taste. Preliminary analysis.
19	Sec. 23, T. 13 N., R. 27 E. Just north of road, near gin house.	A. R. Trammell	Jetted	385	4		Eutaw	Dom. and stock	Preliminary analysis. This well and others on place used to flow until 1925 when other wells were developed 8 miles east.
22	About .5 mile east of Spring Hill, on north side of road.	A. L. Sylvester	Jetted	280	4		lower Blufftown	Dom. and stock	Preliminary analysis.
30	About .1 mile south of North Fork Cowikee Creek, old Seale road.	Eufaula Rotary Club	Jetted	431	4	40	Eutaw	Swimming pool	Preliminary analysis.
							Bullock County		
2	Union Springs, City Waterworks lot, well east of pump house.	City Waterworks	Drilled	1049	12	939	Tuscaloosa	Public supply	City consumption—175,000 gallons a day. Complete analysis.
35	U.S. 29, 2.8 miles south of church at Aberfoil on U.S. 29, east side of road.	K. S. Houston	Jetted	79	3	79	Cusseta	Dom. and stock	Finished with gravel packed, punched pipe. Preliminary analysis.
40	U.S. 29, .6 mile north of Double Creek, on east side of road.	G. A. Main	Jetted	200	4		Cusseta	Dom. and stock	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Chilton County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
4	Dr. H. M. Nix	Dec. 20, 1940	.....	.....	.....	.....	.....	.....	.....	6.0	2	7	0	.....	28
15	Thorsby Water Works	Dec. 20, 1940	.....	.....	.....	.....	.....	.....	.....	4.0	1	43	0	.....	18

Crenshaw County

1	G. W. Davis	Nov. 16, 1940	.....	.....	.....	.....	.....	.....	.....	84	10	2	0	.....	62
2	Highland Home High School	Nov. 16, 1940	.....	.....	.....	.....	.....	.....	.....	234	60	5	0	.....	183
5	J. K. Foshee	Nov. 16, 1940	.....	.....	.....	.....	.....	.....	.....	201	3	2	0	.....	128

TABLE 2—Continued

Records of wells and springs listed in table 1

Chilton County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
4	Maplesville, Ala.	Dr. H. M. Nix	Jetted	237			Tuscaloosa	Dom.	Supplies water for ten places in town. Preliminary analysis.
15	Thorsby, west of station beneath water tank.	Thorsby Waterworks	Drilled	94	8		Tuscaloosa	Public supply	Treated with lime for CO_2 gas removal. 12,000 gallons a day average consumption. Drawdown 18 feet after 12 hours pumping at 20 g.p.m. Well finished with 12½ feet of 8 inch screen. Preliminary analysis.

Crenshaw County

1	Highland Home, just north of road to Lapine, east side of road.	G. W. Davis	Jetted	293	4	293	Cusseta	Dom. and stock	Preliminary analysis.
2	Highland Home	Highland Home High School	Jetted	425	4		Cusseta	School	Preliminary analysis.
5	Bradleyton, under windmill, behind G. S. Baggett store.	J. K. Foshee	Jetted	190	4		Cusseta	Dom. and stock	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Dallas County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1	Selma Waterworks	Jan. 23, 1941	103	17	1.6	20	3.8	4.1	6.0	89	6.1	2.5	0.2	0.08	66
14	Swift & Co. Oil Mill	Jan. 23, 1941	68	15	6.1	11	3.0	4.9	3.3	52	5.9	3.2	.1	.05	40
34	G. E. Williams	Jan. 30, 1941	.....	.....	.....	.....	.....	.....	.....	111	5	3	.0	.....	63
40	L. C. Farley	Jan. 30, 1941	.....	.....	.....	.....	.....	.....	.....	192	7	8	.2	.....	24
42	Mrs. Malena K. Knight	Jan. 30, 1941	.....	.....	.....	.....	.....	.....	.....	261	4	8	1.2	.....	22
49	W. P. Mollette	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	294	6	10	.6	.....	6
51	Louisville & Nashville R. R.	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	141	5	4	.2	.....	6
52	Gordon Russell	Oct. 30, 1940	.....	.....	.....	.....	.....	.....	.....	404	2	16	2.0	.....	18
54	Mrs. E. S. Russell	Oct. 30, 1940	.....	.....	.....	.....	.....	.....	.....	504	2	32	2.8	.....	24
57	L. G. Simms	Oct. 30, 1940	.....	.....	.....	.....	.....	.....	.....	452	1	30	2.4	.....	24
67	W. S. Randall	Oct. 30, 1940	.....	.....	.....	.....	.....	.....	.....	99	6	3	0	.....	34

TABLE 2—Continued

Records of wells and springs listed in table 1

Dallas County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Selma Avenue, east of Sylvan Street, south of corner of turbine shed.	Selma Waterworks	Drilled	483	26-12	400	basal Eutaw	Public supply	Drawdown measured at 65.2 feet after 80 minutes pumping. Gravel packed, 83 feet of 12 inch screen. Complete analysis. Observation well.
14	Selma, Plant Street, north of railroad tracks.	Swift and Co. Oil Mill	Jetted	641	4	639	Tuscaloosa	Ind	Complete analysis. Well finished with 20 inches of bronze wire strainer.
34	Ala. 22, 1.3 miles northeast of Childers Creek, north side of road.	G. E. Williams	Jetted	480	4		Eutaw	Dom. and stock	Flowing well. Preliminary analysis.
40	Ala. 22, Beloit, northeast corner of crossroad, in yard of post office.	L. C. Farley	Jetted	480	4		Eutaw	Dom. and stock	Preliminary analysis.
42	Hazen, off Ala. 22 at gin house.	Mrs. Malena K. Knight	Jetted	600	5		Eutaw	Ind	Preliminary analysis.
49	Crumptonia, in fields southwest of well no. 48.	W. P. Mollette	Jetted	1011	4	1011	Eutaw	Dom. and stock	Flowing well. Preliminary analysis.
51	Martins Station, beside water tank.	Louisville and Nashville Railroad	Jetted	755			Eutaw	Railroad	See Smith, page 199. Water level was originally 27½ feet above land surface. Preliminary analysis.
52	Ala. 22, 1.7 miles west of Martins Station, behind house.	Gordon Russell	Jetted	780	4		Eutaw	Dom	Preliminary analysis.
54	Safford, beside Russell home	Mrs. E. S. Russell	Jetted	900	4		Eutaw	Dom	Preliminary analysis.
57	Ala. 5, 4.6 miles north of railroad crossing at Blalock, east of road.	L. G. Simms	Jetted	800	3		Eutaw	Dom. and stock	Preliminary analysis.
67	Marion Junction, .1 mile south of railroad east side of road.	W. S. Randall	Jetted	700	6½		Tuscaloosa	Dom. and stock	Base of Selma reported at 125 feet. Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Dallas County—Continued

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
68	J. C. Chisolm	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	242	6	6	.6	.....	30
77	J. E. Kendricks	Dec. 19, 1940	.....	.....	.....	.....	.....	.....	.....	206	4	5	.4	.....	21
79	Mrs. Joe Tiliman	Dec. 19, 1940	.....	.....	.....	.....	.....	.....	.....	115	4	2	0	.....	34
80	A. H. Vickery	Dec. 19, 1940	.....	.....	.....	.....	.....	.....	.....	287	7	16	1.6	.....	24
91	J. W. Lloyd	Oct. 30, 1940	.....	.....	.....	.....	.....	.....	.....	98	12	31	.2	.....	32
94	J. B. Hain	Jan. 30, 1941	.....	.....	.....	.....	.....	.....	.....	135	8	22	.0	.....	14
97	G. M. Sumner	Oct. 30, 1940	.....	.....	.....	.....	.....	.....	.....	205	28	186	1.3	.....	38

TABLE 2—Continued

Records of wells and springs listed in table 1

Dallas County—Continued

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
68	Marion Junction, north side of U.S.80.	J. C. Chisolm....	Jetted	340	4	.....	Eutaw.....	Dom. and stock...	Preliminary analysis.
77	U.S. 80 at crossroads north of Massillon Station, under windmill.	J. E. Kendricks	Jetted	400	4	.....	Eutaw.....	Dom. and stock...	Preliminary analysis.
79	U.S. 80, .3 mile east of Bogue-chitto Creek, north side of road.	Mrs. Joe Tilman	Jetted	600	4	.....	Eutaw.....	Dom. and stock...	Preliminary analysis.
80	U.S. 80, Browns, northwest corner of crossroads.	A. H. Vickery....	Jetted	420	4	420	Eutaw.....	Dom. and stock...	Preliminary analysis.
91	About .35 mile north of Tyler crossroads on U.S. 80.	J. W. Lloyd	Jetted	780	4	.....	Tuscaloosa.....	Dom.....	No H_2S. Preliminary analysis.
94	Ala. 43, Sardis, behind large house north of store.	J. B. Hain.....	Jetted	750	4	.....	Eutaw.....	Dom.....	Preliminary analysis.
97	Ala. 43, 3.7 miles south of Cedar Creek bridge at top of cuesta, east side of road.	G. M. Sumner....	Jetted	1200	4	150	Eutaw.....	Dom. and stock...	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Elmore County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1	C. M. Harwell	Oct. 23, 1940	.....	.....	.....	.....	.....	.....	.....	119	7	2	.4	.....	75
10	H. C. Cobb, Sr.	Oct. 23, 1940	.....	.....	.....	.....	.....	.....	.....	68	4	1	.6	.....	46
16	Dr. J. S. Harmon	Oct. 23, 1940	.....	.....	.....	.....	.....	.....	.....	67	5	1	.4	.....	40
18	Draper State Prison	Oct. 23, 1940	.....	.....	.....	.....	.....	.....	.....	78	6	3	.5	.....	46

Greene County

1	Midway Inn	Dec. 10, 1940	.....	.....	.....	.....	.....	.....	.....	96	1	2	0	.....	60
7	Alabama Water Service Company	Feb. 6, 1941	1,027	12	0.05	9.9	2.1	391	7.7	338	1.2	428	2.4	2.9	33

TABLE 2—Continued

Records of wells and springs listed in table 1

Elmore County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Ala. 9, .6 mile north of Tallapoosa River, .2 mile west of road.	C. M. Harwell	Jetted	235	4		Tuscaloosa	Dom. and stock	Preliminary analysis. Water level stood at 3 feet above land surface when bored.
10	Ala. 45, 1.6 miles north of Montgomery County line, out road to west, 1 mile, turn south.	H. C. Cobb, Sr.	Jetted	210	4		Tuscaloosa	Dom. and swimming pool	Preliminary analysis.
16	Elmore, near end of street running west from station, opposite brick house.	Dr. J. S. Harmon	Jetted	118	4		Tuscaloosa	Dom.	Preliminary analysis.
18	Inside prison wall, southeast of well no. 19.	Draper State Prison	Drilled	190	8		Tuscaloosa	Prison	Preliminary analysis.

Greene County

1	U. S. 43, .5 mile south of Tuscaloosa County line.	Midway Inn	Jetted	497	4		Tuscaloosa	Dom.	Preliminary analysis.
7	Eutaw, Ala.	Alabama Water Service Co.	Drilled	306	15-8	260	Eutaw	Public supply	Reported that water of high iron content was encountered at 100 feet, water level stood at 16 feet below land surface. Complete analysis. 46 feet of 8 inch screen.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Greene County—Continued

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
11	Town of Boligee	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	447	2	672	1.4	.....	38
13	W. F. Bell	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	408	1	822	1.6	.....	54
17	Lynn Dearman	Dec. 8, 1940	.....	.....	.....	.....	.....	.....	.....	219	1	2,275	1.4	.....	188
18	J. I. Thornton	Nov. 22, 1940	.....	.....	.....	.....	.....	.....	.....	300	1	2,300	.8	.....	201
19	Mrs. Charles Wells	Oct. 19, 1940	.....	.....	.....	.....	.....	.....	.....	175	1	3,375	.4	.....	390
20	Dr. H. B. Klie	Nov. 22, 1940	.....	.....	.....	.....	.....	.....	.....	622	1	55	3.7	.....	15
29	Mrs. Mary Richardson	Oct. 3, 1940	.....	.....	.....	.....	.....	.....	.....	130	10	5	.2	.....	39
33	Gordon Colson Gin Co.	Nov. 29, 1940	.....	.....	.....	.....	.....	.....	.....	180	1	46	.7	.....	14
35	W. H. Williams	Nov. 29, 1940	.....	.....	.....	.....	.....	.....	.....	224	1	241	1.1	.....	14
38	Miss A. S. Smith	Feb. 6, 1941	.....	.....	.....	.....	.....	.....	.....	135	3	5	.2	.....	56
39	Lon Grubbs	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	6	6	78	0.0	13	63
40	M. J. Hollingsworth	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	154	10	4	0.0	.....	69

TABLE 2—Continued

Records of wells and springs listed in table 1

Greene County—Continued

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
11	Boligee, northwest side of McKee Bouchelle store.	Town of Boligee	Jetted	540			Eutaw	Dom. and stock	Preliminary analysis.
13	Boligee, old mill house lot, 200 feet northwest of station.	W. F. Bell	Jetted	560	3		Eutaw	Stock and obs	Preliminary analysis.
17	Boligee to Tishabee road, .3 mile north of Taylor Creek, west of road.	Lynn Dearman	Bored	500-600			Eutaw	Dom. and stock	Preliminary analysis.
18	Watsonia, behind main house	J. I. Thornton	Jetted	608	4		Eutaw	Dom. and stock	Preliminary analysis.
19	Township 19 North, Range 2 East. north half of section 6.	Mrs. Charles Wells	Bored				Eutaw	Stock	Preliminary analysis.
20	Forkland, Ala.	Dr. H. B. Klie	Jetted	660	4		Eutaw	Dom. and stock	Preliminary analysis.
29	About 1 mile northwest of Lewiston, near Sipsey River.	Mrs. Mary Richardson	Bored	460(?)			Eutaw	Dom. and stock	Preliminary analysis.
33	Clinton, Ala. beside gin house.	Gordon Colson Gin Co.	Jetted	360	4	20	Eutaw	Dom. and stock	Water overflowed at 140 feet. Attempt was made to go deeper for a stronger overflow, but was unsuccessful. Preliminary analysis.
35	New West Greene, beside barn and pig pen on west side of railroad.	W. H. Williams	Jetted	500(?)	4		Eutaw	Stock	Preliminary analysis.
38	U. S. 11, .5 mile south of "Cotton Patch", east side of road.	Miss A. S. Smith	Jetted	300	3½	4	Eutaw	Dom	Preliminary analysis.
39	Eutaw, Ala.	Lon Grubbs	Dug	29.5			Eutaw	Dom	Preliminary analysis.
40	Eutaw, Ala. East side of U.S. 11, ½ mile south of Eutaw.	M. J. Hollingsworth	Jetted	500	4	20	Tuscaloosa	Dom. and stock	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Hale County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as $Ca\ CO_3$
1	Alabama Water Service Co.	Feb. 6, 1941	121	20	3.3	24	5.0	6.5	6.2	101	8.6	5.5	.2	.24	80
2	Alabama Water Service Co.	Feb. 6, 1941	262	18	3.6	47	10	21	9.1	141	34	46	.1	1.2	158
16	J. P. McQuillan	Dec. 10, 1940								156	10	2	.2		10
30	J. H. Collins	Dec. 10, 1940								282	5	2	.4		7.5
35	M. B. True	Dec. 10, 1940								153	12	12	0		34
44	Moundville City Waterworks	Nov. 3, 1940								107	5	2	.1		80
46	G. F. Bishop	Dec. 10, 1940								165	1	810	.5		201
47	C. H. Martin & Town of Akron	Dec. 10, 1940								39	6	2	0		21
48	W. M. Wedgworth	Dec. 10, 1940								66	7	35	0		51
50-A	W. M. Wedgworth	Dec. 10, 1940								64	5	137	.5		76
50-B	W. M. Wedgworth	Dec. 10, 1940								108	2	3,525	.9		1,215

TABLE 2—Continued

Records of wells and springs listed in table 1

Hale County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Greensboro, at pumping plant, inside front building.	Alabama Water Service Co.	Drilled	390	18-8	290	Eutaw	Public supply	Complete analysis. 150,000 gallons a day consumption. 100 feet of 8 inch screen.
2	Greensboro, at pumping plant, behind rear building.	Alabama Water Service Co.	Drilled	300	10	260	Eutaw	Public supply	Complete analysis. 37 feet of drawdown after 6 hours pumping at 97 gallons per minute.
16	3.1 miles south of St. Peter's Church crossroads, .35 mile west of road.	J. P. McQuillan	Jetted	700	9-4		Eutaw	Dom. and stock	Preliminary analysis.
30	U.S. 80, .1 mile west of Ala. 13 junction, north of road, south of house.	J. H. Collins	Jetted	820	4-2		Eutaw	Dom. and stock	Cased through top soil and in Eutaw, but not in Selma chalk. preliminary analysis.
35	Newbern, .4 mile north of railroad, west side of road.	M. B. True	Jetted	300	4		Eutaw	Dom	Preliminary analysis.
44	Moundville, Ala.	Moundville City Waterworks	Drilled	469	8		Tuscaloosa	Public supply	Preliminary analysis.
46	Akron, Ala.	G. F. Bishop	Jetted	595	4-1½	595	Tuscaloosa	Stock	Preliminary analysis. Original yield 50 g.p.m. reported.
47	Akron, Ala.	C. H. Martin & Town of Akron	Jetted	260	4		Tuscaloosa	Dom. and stock	Preliminary analysis.
48	Ala. 60, Wedgworth, north ow big well, west side of road.	W. M. Wedgworth	Jetted	300	4		Tuscaloosa	Dom. and stock	Preliminary analysis.
50	Ala. 60, Wedgworth, east of road.	W. M. Wedgworth	Jetted	1490	12-8	1410	Tuscaloosa?	Swimming pool	Water from 536 feet depth piped off separately—74 degrees temperature, preliminary analysis of this water (50-A). Preliminary analysis of water from 1410 feet also (50-B).

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Lamar County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
2	Sulligent Cotton Oil Co.	Dec. 2, 1940	.....	.....	.....	.....	.....	.....	.....	44	1	6	0	.....	18
6	Mrs. J. H. Rowland	Dec. 3, 1940	.....	.....	.....	.....	.....	.....	.....	(a)	3	103	0	0.25	72
9	Vernon Water Works	Dec. 3, 1940	.....	.....	.....	.....	.....	.....	.....	20	7	2	0	.....	20
16	Kennedy High School	Dec. 4, 1940	.....	.....	.....	.....	.....	.....	.....	33	3	3	0	.....	28
18	W. K. Black	Dec. 4, 1940	.....	.....	.....	.....	.....	.....	.....	16	7	1	0	.....	12
1,2,3	Sulligent Water Works (spring)	Dec. 2, 1940	.....	.....	.....	.....	.....	.....	.....	5.0	1	1	0	.....	9
4	Mrs. J. D. Wilson (spring)	Dec. 2, 1940	.....	.....	.....	.....	.....	.....	.....	9	3	3	0	.5	10
						Lee County									
1	C. J. Coggins	Nov. 13, 1940	.....	.....	.....	.....	.....	.....	.....	35	2	12	0	9.8	26
9	J. A. Segrist	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	122	2	2	0	.....	72

a) Slightly acid.

TABLE 2—Continued

Records of wells and springs listed in table 1

Lamar County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
2	Sulligent, Ala., well in yard of the company.	Sulligent Cotton Oil Co.	Jetted	200	2½		Tuscaloosa	Ind.	Preliminary analysis.
6	Ala. 18, .25 mile west of Fayette County line, south side of road.	Mrs. J. H. Rowland	Dug	30			Tuscaloosa	Dom.	Preliminary analysis. On August 15, 1941, chloride was 136 p.p.m.
9	Vernon, Ala.	Vernon Waterworks	Drilled	135	16-6		Tuscaloosa	Public supply	Preliminary analysis. Well is pumped 100 g.p.m. to an elevated floculation tower for iron removal.
16	Kennedy, Ala., in front of school.	Kennedy High School	Jetted	165	4		Tuscaloosa	School	Preliminary analysis.
18	Ala. 19, .2 mile north of railroad at Millport, west of road.	W. K. Black	Jetted	113	4		Tuscaloosa	Stock	Preliminary analysis.
1,2,3	North side of Bogue Creek, just west of Vernon Highway.	Sulligent Waterworks (springs)					Alluvial sand	Public supply	All three springs are pumped together at 100 gallons a minute. Preliminary analysis for mixture of water from all three springs. Springs are developed with concrete shafts sunk 4 to 6 feet deep.
4	Melborne, Ala., .1 mile west of station sign, north side of road.	Mrs. J. D. Wilson (spring)					Tuscaloosa	Dom.	Preliminary analysis.

Lee County

1	U.S. 241, Smith Station at Post Office.	C. J. Coggins	Dug	16.7			Tuscaloosa	Dom.	Preliminary analysis.
9	U.S. 29, .5 mile north of Macon County line—out farm road from west side of highway.	J. A. Segrist	Drilled	165	6		Crystalline limestone	Dom. and stock	Well has never run dry. Basement hit below Tuscaloosa at 120 feet. Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Lowndes County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
2	J. B. Clements	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	39	8	415	.3	.....	128
5	Maxon-Premix Burner Co.	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	32	2	1,300	0	.....	585
10	D. L. Gordon	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	20	1	2	0	.....	16
11	W. D. McCurdy	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	75	5	27	0	.....	21
14	Mary D. Carr	Dec. 17, 1940	.....	.....	.....	.....	.....	.....	.....	732	1	335	3.0	.....	40
16	W. L. Pylant	Dec. 16, 1940	.....	.....	.....	.....	.....	.....	.....	709	9	280	5.8	.....	60
18	Foremost Dairies, Inc.	Jan. 23, 1941	1,121	18	0.04	11	4.0	433	6.8	679	1.9	297	5.4	2.2	44
24	M. W. Sanderson	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	804	2	135	6.4	.....	28
25	G. P. McPherson	Dec. 16, 1940	.....	.....	.....	.....	.....	.....	.....	610	150	203	4.5	.....	174
27	W. D. Farrior	Dec. 16, 1940	.....	.....	.....	.....	.....	.....	.....	803	1	152	6.8	.....	51
28	Waverly Guy	Dec. 18, 1940	.....	.....	.....	.....	.....	.....	.....	671	13	132	5.6	.....	33

TABLE 2—Continued

Records of wells and springs listed in table 1
Lowndes County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
2	Benton, Ala.	J. B. Clements	Jetted	425	5	35	Eutaw	Dom.	Preliminary analysis.
5	Edson, .5 mile east of house, in fields north of railroad.	Maxon-Premix Burner Co.	Jetted	450	4		Eutaw	Stock	Flowing well. Preliminary analysis.
10	Out road running northwest from White Hall, 2.6 miles.	D. L. Gordon	Jetted	600	3		Tuscaloosa	Dom. and stock	Original yield reported to be 40 g.p.m. Preliminary analysis.
11	U.S. 80, 3.5 miles west of Lowndesboro, out road turning south.	W. D. McCurdy	Jetted	860			Tuscaloosa	Dom. and stock	Preliminary analysis. See Smith, page 207.
14	U.S. 80, 4.2 miles east of Lowndesboro, .25 mile north of highway.	Mary D. Carr	Jetted	380	4		Eutaw	Dom.	Preliminary analysis.
16	U.S. 80, .9 mile east of well no. 15, south side of road in field.	W. L. Pylant	Jetted	330	4		Eutaw	Dom. and stock	Preliminary analysis.
18	U.S. 80, 1.8 miles east of well no. 15, south side of road, beside dairy.	Foremost Dairies, Inc.	Jetted	410	4		Eutaw	Dairy	Complete analysis.
24	First house southeast of well no. 23, Letohatchee.	M. W. Sanderson	Jetted	765	4		Eutaw	Dom.	Preliminary analysis.
25	Tyson, under water tank near store.	G. P. McPherson	Jetted	498	4	40	Eutaw	Dom.	Preliminary analysis.
27	East side of road, 2.4 miles southeast of railroad at Letohatchee, under windmill.	W. D. Farrior	Jetted	840	4		Eutaw	Dom. and stock	Preliminary analysis.
28	U.S. 31, west side of road, just south of Ala. 97 turn-off. "Guy's Way Side Inn".	Waverly Guy	Jetted	1000	4		Eutaw	Dom.	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Lowndes County—Continued

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
30	Town of Fort Deposit	Jan. 25, 1941	527	26	1.3	105	23	49	6.3	420	104	13	0	1.4	357
33	O. W. Till	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	211	200	30	.5	.....	32
41	B. H. Gardner	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	115	12	74	0	.....	16
20	City of Hayneville	Oct. 29, 1940	.....	.....	.....	.....	.....	.....	.....	129	7	91	.2	.....	15

TABLE 2—Continued
Records of wells and springs listed in table 1
Lowndes County—Continued

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
30	Fort Deposit, under water tank.	Town of Fort Deposit	Drilled	300	8	260	Ripley.....	Public supply.....	Well finished with 40 feet of 6 inch strainer. Drawdown 50 feet after 8 hours pumping at 62 g.p.m. This level remained constant through 17 more hours of steady pumping. Complete analysis.
33	Out road, .7 mile northwest of well no. 34.	O. W. Till.....	Jetted	156	4	.....	Ripley.....	Dom. and stock...	Preliminary analysis.
41	Gordonsville, at crossroads.	B. H. Gardner..	Jetted	1232	.....	.....	Tuscaloosa.....	Dom. and stock...	Preliminary analysis. Eutaw water cased off.
20	Southeast corner of public square.	City of Hayneville	Jetted	1025	.....	1000 (?)	Tuscaloosa.....	Public supply.....	Salt water at 600 feet, cased off. Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Macon County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as $Ca\ CO_3$
1	Tuskegee Institute	Jan. 24, 1941	70	40	.02	4.0	1.6	3.8	3.4	29	2.8	2.2	.1	.05	17
2	Tuskegee Institute	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	13	1	2	0	.....	7.5
7	U. S. Dept. of Agri. Soil Conservation Service	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	69	5	2	0	.....	42
15	Western of Alabama R. R.	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	108	1	11	.7	.....	48
18	Notasulga Waterworks	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	85	13	9	.2	.....	66
28	W. E. Huddleston	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	74	4	4	.1	.....	52
34	C. G. Peterson	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	8	1	2	0	6.7	15
41	J. G. Fuller	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	188	85	51	0	.....	207
1	Notasulga Waterworks (spring)	Nov. 12, 1940	.....	.....	.....	.....	.....	.....	.....	6	1	3	.1	2.9	9

TABLE 2—Continued

Records of wells and springs listed in table 1

Macon County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Just north of north end of school laundry.	Tuskegee Institute	Drilled	355	18-8	337	Tuscaloosa	School	Owner's designation — Well A. Complete analysis. 40 feet of 8 inch shutter screen.
2	About 400 yards west of power house, southwest of paved road.	Tuskegee Institute	Drilled	256	18-10	206	Tuscaloosa	School	Owner's designation—Well B. Preliminary analysis. 50 feet of 10 inch shutter screen.
7	U.S. 80, .3 mile northeast of Uphapee Creek, north side of road, inside lot.	U. S. Dept. of Agri. Soil Cons. Service	Drilled	120	6		Tuscaloosa	Sanitary and irrigation	Well at work's center. Preliminary analysis.
15	Chehaw, across tracks from station.	Western of Alabama R.R.	Jetted	286	8	35	Tuscaloosa	Dom.	Strong drawdown with a hand pump reported, followed by a slow recovery. Preliminary analysis.
18	Notasulga, town well.	Notasulga Waterworks	Drilled	260	4		Basement complex	Public supply	Used only in emergency. Preliminary analysis.
28	Liverpool, across from store.	W. E. Huddleston	Jetted	210	4	30	Tuscaloosa	Dom. and stock	Preliminary analysis.
34	U.S. 80, .9 mile west of Polecat Springs, north side of road, next to Gubahatchee Church.	C. G. Peterson	Jetted	90	4		Tuscaloosa	Dom.	Preliminary analysis. Well penetrated to 400 feet, could get no water below 90 feet.
41	U.S. 29, 1.15 miles north of Seaboard Air Line Railway, west side of road, about 40 feet from paved highway.	J. G. Fuller	Jetted	450	4		Eutaw	Dom. and stock	Preliminary analysis.
1	On hillside north of town.	Notasulga Waterworks (spring)					Tuscaloosa	Public supply	Preliminary analysis. Consumption from spring 10,000 to 12,000 gallons per day. Basement complex at 40 feet.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Marengo County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
2	B. W. Compton	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	524	1	1,275	2.0	.....	42
3, 4	Demopolis Waterworks	Feb. 6, 1941	611	13	0.10	3.1	1.4	242	4.4	429	1.5	130	1.3	1.9	13
5	Town of Faunsdale	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	416	2	17	1.3	.....	9
6	W. H. and J. J. Brown	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	471	1	49	2.4	.....	16
8	Chickasaw State Park	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	733	1	182	3.7	.....	15
9	Town of Linden	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	688	1	530	3.2	.....	18
10	Town of Linden	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	638	1	690	3.2	.....	30
11	Mrs. C. L. Mayton	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	65	6	13	.3	8.9	74
12	Dr. E. T. Norman	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	182	10	27	.4	1.9	178
13	Town of Thomaston	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	496	1	580	3.2	.....	42
14	Dr. C. J. Stallworth	Jan. 22, 1942	.....	.....	.....	.....	.....	.....	.....	6	4	34	.1	33	57

TABLE 2—Continued
Records of wells and springs listed in table 1
Marengo County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
2	U.S. 80, .3 mile west of turn-off to Jefferson, south side of road.	B. W. Compton	Jetted	996			lower Eutaw	Dom. and stock	Preliminary analysis.
3	Demopolis, in water works yard.	Demopolis Waterworks	Drilled	900	8-6		lower Eutaw	Public supply	Complete analysis of mixture of water from wells no. 3 and 4.
4	Demopolis, 1200 feet due east of no. 3.	Demopolis Waterworks	Drilled	900	8		lower Eutaw	Public supply	
5	Faunsdale, at waterworks yard.	Town of Faunsdale	Jetted	850	4		lower Eutaw	Public supply	Preliminary analysis.
6	Faunsdale, .1 mile west of waterworks.	W. H. and J. J. Brown	Jetted	560	4		upper Eutaw	Dom	Preliminary analysis. See Smith, p. 186, J. C. Brown well.
8	U.S. 43, 5.7 miles south of Spring Hill crossroad, east of road in grove.	Chickasaw State Park	Jetted	1100	4		Eutaw	Dom. and stock	Preliminary analysis.
9	Linden, in brick house beneath water tower.	Town of Linden	Drilled	1080	10		upper Eutaw	Public supply	Preliminary analysis.
10	Linden, in small brick house at corner of court house block.	Town of Linden	Drilled	1245	6		middle Eutaw	Public supply	Preliminary analysis.
11	Linden, north side of town on U.S. 43 east side of road.	Dr. C. L. Mayton	Dug	20			Clayton	Dom	Preliminary analysis.
12	Linden, two blocks east of court house on Ala. 28.	Dr. E. T. Norman	Dug	29.5			Clayton	Dom	Preliminary analysis.
13	Thomaston, south side of Ala. 28, beside pond.	Town of Thomaston	Drilled	1400			Eutaw	Public supply	Preliminary analysis.
14	Thomaston, Ala.	Dr. C. J. Stallworth	Dug	25			Clayton	Dom	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Montgomery County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
10	City of Montgomery	Feb. 14, 1941	158	26	.03	5.9	.9	46	2.0	123	6.0	10	.2	.31	18
11	City of Montgomery	Jan. 25, 1941	272	15	.02	1.6	.3	104	2.6	240	23	9.8	1.0	.45	5.2
13	City of Montgomery	Jan. 25, 1941	34	16	.02	1.7	.7	2.6	.9	6.0	1.4	2.9	.0	3.6	7.1
45	Kilby State Prison	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	223	15	286	1.4	.....	27
46	Kilby State Prison	Oct. 25, 1940	.....	.....	.....	.....	.....	.....	.....	113	10	123	.6	.....	21
47	Kilby State Prison	Oct. 25, 1940	.....	.....	.....	.....	.....	.....	.....	3.0	5	10	0	9.3	18
51	John W. Merrill	Dec. 7, 1940	.....	.....	.....	.....	.....	.....	.....	257	36	16	.4	.....	26
53	L. F. Haigler	Oct. 26, 1940	.....	.....	.....	.....	.....	.....	.....	304	34	56	2.4	.....	30
54	Lee Shepherd	Dec. 17, 1940	.....	.....	.....	.....	.....	.....	.....	516	4	102	3.8	.....	33
56	H. S. Mason	Dec. 17, 1940	.....	.....	.....	.....	.....	.....	.....	254	50	33	.6	.....	21
58	E. H. Stacey	Dec. 17, 1940	.....	.....	.....	.....	.....	.....	.....	270	34	44	1.5	.....	12

TABLE 2—Continued

Records of wells and springs listed in table 1

Montgomery County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
10	Montgomery, east side of Ripley St., between Fountain and Alexander. Owner's No. 12 E.	City of Montgomery	Drilled	218	26	181	Tuscaloosa.....	Public supply.....	Complete analysis. 8 inch screens set at 138 to 178 feet, 181 to 214 feet.
11	Montgomery, east side of Ripley St., just north of well no. 9 (11 E.) Owner's No. 13 E.	City of Montgomery	Drilled	631	13	587	Tuscaloosa.....	Public supply.....	Complete analysis. 12 inch screen set at 587 to 631 feet.
13	Montgomery, just north of well no. 12 (14 E). Owner's No. 15 E.	City of Montgomery	Drilled	81	14	50	Eutaw.....	Public supply.....	Screen set at 50 to 81 feet. Complete analysis.
45	Ala. 9, northeast of Montgomery, inside prison.	Kilby State Prison	Drilled	600	.....	.....	Tuscaloosa.....	Prison.....	Preliminary analysis.
46	Ala. 9, northeast of Montgomery, inside prison.	Kilby State Prison	Drilled	400	.....	.....	Tuscaloosa.....	Prison.....	Preliminary analysis.
47	Ala. 9, northeast of Montgomery, inside prison.	Kilby State Prison	Drilled	80	.....	.....	Eutaw.....	Prison.....	Preliminary analysis.
51	U.S. 80, 1.7 miles west of Louisville and Nashville Railroad viaduct, south side of road.	John W. Merrill	Jetted	180	4	.....	Eutaw.....	Dom.....	Preliminary analysis.
53	U.S. 80, 3.4 miles east of Lowndes County line, south side of road.	L. F. Haigler....	Bored	180	4	.....	Eutaw.....	Dom. and stock...	Preliminary analysis.
54	U.S. 80, 2 miles east of Lowndes County line, .7 mile south of road.	Lee Shepherd	Jetted	200	4	.....	Eutaw.....	Dom. and stock...	Preliminary analysis.
56	Hope Hull road, .5 mile west of U.S. 31, north side of road.	H. S. Mason.....	Jetted	310	4	20	Eutaw.....	Dom. and stock...	Not the first water. Preliminary analysis.
58	Hope Hull road, 1.2 miles southwest of Louisville and Nashville Railroad, east side of road.	E. H. Stacey.....	Jetted	400	4	.....	Eutaw.....	Dom. and stock...	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Montgomery County—Continued

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
59,60	McLean Stewart Dairy	Dec. 18, 1940	.....	.....	.....	.....	.....	.....	.....	262	34	28	.9	.....	9
61	A. R. Garrett	Dec. 18, 1940	.....	.....	.....	.....	.....	.....	.....	420	18	52	2.2	.....	10
65	J. M. Cutts and Sons	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	271	30	7	.4	.....	94
66	Mrs. F. H. Mason	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	306	90	173	1.9	.....	33
68	R. R. Shepherd	Dec. 18, 1940	.....	.....	.....	.....	.....	.....	.....	291	19	28	.9	.....	8
69	P. M. McIntyre	Dec. 18, 1940	.....	.....	.....	.....	.....	.....	.....	382	15	51	2.3	.....	15
77	Mrs. C. W. Barrett	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	260	18	6	.1	.....	186
82	Montgomery County High School	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	9	3	15	.1	7.5	22

TABLE 2—Continued

Records of wells and springs listed in table 1

Montgomery County—Continued

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
59	U.S. 31, 1.7 miles south of Hope Hull road, west side of road, in shed behind dairy barn, east well.	McLean Stewart Dairy	Jetted	390	4		Eutaw	Dairy and dom.	Second water. Reserve well. Preliminary analysis mixture of water from 59 and 60.
60	U.S. 31, 1.7 miles south of Hope Hull road, west side of road, 20 feet west of no. 59.	McLean Stewart Dairy	Jetted	390	4		Eutaw	Dairy and dom.	Deepened from 290 feet to 390 feet in 1938.
61	U.S. 31, Pintlalla, .5 mile north of crossroads, west side of road.	A. R. Garrett	Jetted	525	5	36	Eutaw	Dom.	Preliminary analysis.
65	Ala. 9, 2 miles north of Snowdoun crossroads, east side of road.	J. M. Cutts and Sons	Jetted	175	3½	100	Eutaw	Dom. and stock	Preliminary analysis.
66	Ala. 9, .9 mile north of Snowdoun crossroads, west side of road.	Mrs. F. H. Mason	Jetted	375	3½		Eutaw	Dom. and stock	Preliminary analysis.
68	Ala. 9, .4 mile south of Atlantic Coast Lines viaduct, east side of road.	R. R. Shepherd	Jetted	490	4		Eutaw	Dom. and stock	Preliminary analysis.
69	Ala. 9, .4 mile north of Legrand crossroads, west side of road.	P. M. McIntyre	Jetted	687	4		Eutaw	Dom. and stock	Preliminary analysis.
77	Lapine, on road just north of county line, .2 mile east of railroad.	Mrs. C. W. Barrett	Jetted	130	4		Cusseta	Dom.	Preliminary analysis.
82	Ramer, southwest of high school building, between well no. 81 and building.	Montgomery County High School	Jetted	60	4		Cusseta	School	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Montgomery County—Continued

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as $CaCO_3$
58	Babcock Dairies	Jan. 25, 1941	281	27	.78	78	7.9	10	2.0	262	21	7.4	.0	.10	227
94	W. B. Britton	Oct. 25, 1940	.....	.....	.....	.....	.....	.....	.....	245	30	11	.6	.....	140
99	George A. Robbins	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	171	9	18	.2	.....	48
101	Alabama State Reform School for Negroes	Oct. 24, 1940	.....	.....	.....	.....	.....	.....	.....	139	12	5	0	0.25	48

TABLE 2—Continued

Records of wells and springs listed in table 1

Montgomery County—Continued

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
85	U.S. 231, 2.1 miles south of Macedonia crossroads, west side of road.	Babcock Dairies	Jetted	125	6	60	Cusseta	Dom. and dairy	Complete analysis.
94	U.S. 231, 1.4 miles southeast of Barachius, at grove, east side of road, beside store.	W. B. Britton	Jetted	210	4	40	Eutaw	Dom	Preliminary analysis.
99	U.S. 80, Mytilene, southwest of railroad crossing, at house.	George A. Robbins	Jetted	400(?)	3		Eutaw	Dom	Preliminary analysis.
101	Well northwest of superintendant's building.	Ala. St. Reform Sch. for negroes	Jetted	75	4		Eutaw	School	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Perry County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1	Fred G. England	Dec. 19, 1940	.....	.....	.....	.....	.....	.....	.....	190	40	6	0.2	.....	63
11	T. I. Ward	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	220	10	9	.4	.....	153
19	Marion Waterworks	Nov. 3, 1940	.....	.....	.....	.....	.....	.....	.....	128	44	4	0	.....	134
20	Marion Waterworks	Nov. 3, 1940	.....	.....	.....	.....	.....	.....	.....	112	10	2	0	.....	88
30	L. B. Sprott	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	7	2	2	0	.....	12
49	Suttle High School	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	13	2	2	0	.....	14
50	J. M. Suther	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	50	10	2	0	.....	42
59	Uniontown Waterworks	Feb. 6, 1941	143	16	0.01	1.9	0.2	51	1.4	132	6.4	1.7	.1	0.86	5.6
64	U. S. Fisheries Station	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	104	5	2	.2	.....	82
67	U. S. Fisheries Station	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	99	5	2	.2	.....	75
73	Ira A. Moore	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	142	5	6	.2	.....	99
77	J. S. Ellard	Oct. 31, 1940	.....	.....	.....	.....	.....	.....	.....	113	8	1	.1	.....	82

TABLE 2—Continued

Records of wells and springs listed in table 1

Perry County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Ala. 5, 2.5 miles north of Dallas County line, west side of road.	Fred G. England	Jetted	300	4	.....	Eutaw	Dom. and stock	Preliminary analysis.
11	Hamburg, behind general store.	T. I. Ward	Jetted	300	4	.....	Eutaw	Dom.	Preliminary analysis.
19	Marion, Ala., behind pumping plant, 20 feet north of well no. 18.	Marion Water-works	Drilled	750	8-6-4½	750	Tuscaloosa	Public supply	Preliminary analysis.
20	Marion, Ala., behind storage tank at reservoir.	Marion Water-works	Drilled	385	18-6	345	Tuscaloosa	Public supply	Preliminary analysis. 90 feet of 18 inch welded pipe, 345 feet of standard weight 8 inch pipe, 40 feet of 6 inch screen gravel wall.
30	At residence, southwest corner of Sprott crossroad, well at house.	L. B. Sprott	Jetted	180	6	.....	Tuscaloosa	Dom. and stock	Preliminary analysis.
49	Ala. 43, Suttle, in back of high school.	Suttle High School	Jetted	444	4	444	Tuscaloosa	School	Preliminary analysis.
50	Ala. 43, .7 mile south of Suttle High School.	J. M. Suther	Jetted	280	5-3½	.....	Tuscaloosa	Dom. and stock	Preliminary analysis.
59	Uniontown, in center of street intersection of Front Street and Water Street.	Uniontown Waterworks	Drilled	1195	8	.....	Eutaw	Public supply	Smith (page 180) reports the original water level at 120 feet below the land surface, water comes from the second horizon at 870 feet. Complete analysis.
64	Between well no. 63 and office.	U. S. Fisheries Station	Jetted	435	4	435	Tuscaloosa	Fish pond	Well no. 2 of the Station. Preliminary analysis.
67	East of road, east of office.	U. S. Fisheries Station	Jetted	240	4	240	Tuscaloosa	Fish pond	Well no. 5 of the Station. Preliminary analysis.
73	Heiberger, .2 mile north of Wallace Creek, west of Ala. 5.	Ira A. Moore	Jetted	435	4	.....	Tuscaloosa	Dom. and stock	Preliminary analysis.
77	Ala. 5, .7 mile south of Bibb County line.	J. S. Ellard	Jetted	280	4	.....	Tuscaloosa	Dom. and stock	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Pickens County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1	Gordo Water Works	Nov. 26, 1940	.....	.....	.....	.....	.....	.....	.....	10	2	2	0	.....	10
2	Consumers Ice and Water Co.	Nov. 27, 1940	.....	.....	.....	.....	.....	.....	.....	12	3	22	0	.5	12
12	Carrollton Water Works	Nov. 27, 1940	.....	.....	.....	.....	.....	.....	.....	20	9	2	0	.....	18
14	S. H. Ball	Nov. 27, 1940	.....	.....	.....	.....	.....	.....	.....	50	8	3	0	.....	42
15	Sallie E. Cunningham	Nov. 27, 1940	.....	.....	.....	.....	.....	.....	.....	91	8	2	.1	.....	63
17	Aliceville Waterworks	Feb. 11, 1941	111	15	.94	3.2	.9	33	3.2	93	5.9	3.4	0	.86	12
20	St. Louis and San Francisco R. R.	Nov. 28, 1940	.....	.....	.....	.....	.....	.....	.....	94	8	1	0	.....	9
22	H. B. Hanson	Nov. 29, 1940	.....	.....	.....	.....	.....	.....	.....	177	1	3	.3	.....	10
24	J. L. King	Nov. 28, 1940	.....	.....	.....	.....	.....	.....	.....	248	1	305	1.0	.....	24

TABLE 2—Continued

Records of wells and springs listed in table 1

Pickens County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Gordo, Ala., waterworks property.	Gordo Waterworks	Jetted	162	4	162	Tuscaloosa	Public supply	Finished with 50 feet of perforated pipe. Preliminary analysis.
2	Reform, Ala., southeast of railroad water tank.	Consumer's Ice and Water Co.	Jetted	60	2		Tuscaloosa	Public supply	One of a group of nine wells, pumped at 50 g.p.m.; 60-90 feet deep, 2 and 3 inch casings. Two drilled in 1911 by John Newell, seven drilled in 1912 by W. M. McPherson. Preliminary analysis.
12	Carrollton, Ala., in waterworks pump house.	Carrollton Waterworks	Drilled	130	12-8		Tuscaloosa	Public supply	Filtered for iron removal. Preliminary analysis.
14	Carrollton, Ala., one block south and one block west of court house.	S. H. Ball	Jetted	530	3		Tuscaloosa	Dom. and stock	Preliminary analysis.
15	Ala. State Fish Hatchery, 1.8 miles south of Dillburg on Ala. 17, at pond 3.	Sallie E. Cunningham	Jetted	200	3		Eutaw	Fish pond	Preliminary analysis.
17	Aliceville, Ala., at waterworks yard.	Aliceville Waterworks	Drilled	357	6	337	Eutaw	Public supply	Complete analysis. Six inch screens set at 270 to 280 feet, and 337 to 357 feet. Pumped at 330 gallons per minute with 23 feet of drawdown.
20	Pickensville, beside railroad, .5 mile west of town, .1 mile south of road.	St. Louis and San Francisco Railroad	Drilled	290	8		Eutaw	Abandoned	Preliminary analysis.
22	Cochrane, Ala., in a grove, 500 feet north of A. McBride store.	H. B. Hanson	Jetted	400	4		Eutaw	Dom. and stock	Preliminary analysis.
24	.8 mile south of Dancy cross-roads, on the old road, east of new road.	J. L. King	Jetted	602	4		Eutaw	Dom. and stock	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Pike County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1,2,3	City of Troy Utilities Dept.	Nov. 15, 1940	.....	.....	.....	.....	.....	.....	.....	213	8	3	0	.....	24
4	City of Troy Utilities Dept.	Jan. 25, 1941	210	14	.05	13	2.8	62	5.0	204	11	3.8	.0	1.0	44
6	Fox Henderson and Son	Nov. 15, 1940	.....	.....	.....	.....	.....	.....	.....	288	30	5	0	.....	195

Russell County

2	Bessie, Corinne and Ruth Faris	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	7	1	15	0	20	21
5	W. M. Burt	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	99	5	49	1.2	.....	21

TABLE 2—Continued
Records of wells and springs listed in table 1
Pike County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	U.S. 231, south side of Conecuh River, west well, nearest to highway.	City of Troy Utilities Dept.	Drilled	280	8		lower Ripley	Public supply	Preliminary analysis for mixture of waters from wells No. 1, 2, and 3.
2	U.S. 231, south side of Conecuh River, center well, 115 feet east of well no. 1.	City of Troy Utilities Dept.	Drilled	280	8		lower Ripley	Public supply	
3	U.S. 231, south side of Conecuh River, east well 115 feet east of well no. 2.	City of Troy Utilities Dept.	Drilled	280	8		lower Ripley	Public supply	
4	U.S. 231, south side of Conecuh River, gravel wall, west of pumping plant.	City of Troy Utilities Dept.	Drilled	237	12-10		lower Ripley	Public supply	Complete analysis.
6	Orion, .4 mile south of crossroads, east side fo road.	Fox Henderson and Son	Jetted	309			Cusseta	Dom. and stock	Preliminary analysis.
			Russell County						
2	On hill top across from Faris General Store, Glenville, beside house.	Bessie, Corinne and Ruth Faris	Drilled	80	4		Cusseta	Dom. and stock	Finished with 4 inch slotted pipe and gravel packed. Preliminary analysis.
5	Pittsview, .2 mile west of crossroads, behind tenant house.	W. M. Burt	Jetted	445	3	26	Blufftown	Dom.	Old J. W. Caldwell gin well. See page 237, Smith. Original yield ½ gallon a minute in flow. Water comes from 225-265 feet depth. Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Russell County—Continued

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
9	City Water Works	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	184	85	16	0	.....	186
13	E. M. Cochrane	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	177	4	2	0	.....	120
14	H. P. Matthews	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	207	5	2	0	.....	142
20	T. R. Hardwick	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	45	3	5	.9	.....	15
26	St. Joseph's School	Jan. 31, 1941	.....	.....	.....	.....	.....	.....	.....	95	8	3	.3	.....	69
27	St. Joseph's School	Jan. 31, 1941	.....	.....	.....	.....	.....	.....	.....	71	7	2	.6	.....	51
29	F. J. Bickerstaff	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	98	36	12	0	.....	74
31	Dixie Brick Co.	Nov. 14, 1940	.....	.....	.....	.....	.....	.....	.....	92	36	26	0	.....	84
40	W. D. Willis	Jan. 31, 1941	.....	.....	.....	.....	.....	.....	.....	129	12	2	.2	.....	86

TABLE 2—Continued

Records of wells and springs listed in table 1

Russell County—Continued

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
9	Hurtsboro, waterworks yard, 50 feet northeast of 75,000 gallon tank.	City Waterworks	Drilled	430	8	410	Tuscaloosa	Public supply	Finished with gravel packed screen. Preliminary analysis.
13	Seale, southeast of railroad station, in Creek Valley, behind house on east side of street.	E. M. Cochrane	Jetted	131	4		Eutaw	Dom. and stock	H_2S detected. Preliminary analysis.
14	Seale, beside garage west of school.	H. P. Mathews	Jetted	410	4		Tuscaloosa	Public supply	Preliminary analysis.
20	Hatchechubee, .3 mile south of railroad, west side of road beside house.	T. R. Hardwick	Jetted	360	4		Tuscaloosa	Dom.	Strong taste of H_2S. Preliminary analysis.
26	Holy Trinity, inside pumping plant.	St. Joseph's School	Jetted	460	4½	60	Eutaw	School and ice plant	Sand and gravel to 60 feet, then marl and sands. Preliminary analysis.
27	Holy Trinity, 50 feet north of pumping plant.	St. Joseph's School	Jetted	900		790	Tuscaloosa	School and ice plant	Preliminary analysis.
29	Brickyard, in middle of brickyard.	F. J. Bickerstaff	Jetted	363	4		lower Tuscaloosa	Dom. and ind.	First water sand at 240 feet, 60 g.p.m. reported. Preliminary analysis.
31	.8 mile north of Brickyard, large plant to east of road.	Dixie Brick Co.	Drilled	299	6		lower Tuscaloosa	Ind. and dom.	Original yield 15 g. p. m. in flow. Original water level 20 feet, above land surface. Preliminary analysis.
40	Ft. Mitchell-Cottonton Road, .4 mile south of Uchee Creek, west side of road, in front of store.	W. D. Willis	Jetted	160	4		basal Eutaw	Dom. and stock	Preliminary analysis.

TABLE 1—Continued

Analyses of water from wells and springs in the Cretaceous Area of Alabama

[Parts per million]

Sumter County

No.	Owner or name	Date of collection	Total dissolved solids	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulphate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Total hardness as Ca CO_3
1	Town of Livingston	Feb. 6, 1941	5,301	14	1.23	69	21	1,934	21	196	.8	3,064	1.8	1.5	259
2	Town of Geiger	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	336	1	372	1.3	.....	15
3	J. H. Pinson	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	506	2	538	3.9	.....	44
4	J. H. Pinson	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	338	1	382	1.8	.....	12
5	R. C. Oliver	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	280	1	325	1.1	.....	10
11	Town of Gainesville	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	351	1	388	1.5	.....	14
13	John Rogers, Jr.	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	336	1	370	1.8	.....	18
14	W. L. Willis and O. M. Cathey	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	478	1	865	1.5	.....	30
15	S. E. Smith	Dec. 31, 1940	.....	.....	.....	.....	.....	.....	.....	357	1	1,425	1.2	.....	58
18	Pete Prolio	Nov. 8, 1940	.....	.....	.....	.....	.....	.....	.....	148	7	5,300	1.2	.....	480

TABLE 2—Continued

Records of wells and springs listed in table 1

Sumter County

Well Number	Location	Owner or Name	Type of Well	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Principal Water-Bearing Formation	Use of Water	Remarks
1	Livingston, northeast corner of public square.	Town of Livingston	Bored	1062			Eutaw	Drinking	Complete analysis. Inflamable gas content reported.
2	Geiger, across street from post-office.	Town of Geiger	Jetted	750	4		middle Eutaw	Dom. and stock	Preliminary analysis. Cased above and below chalk.
3	Geiger, behind Pinson's store	J. H. Pinson	Jetted	600	4		upper Eutaw	Dom.	Preliminary analysis. Water level has gone down 10 feet since 1926.
4	Geiger, at Pinson's residence	J. H. Pinson	Jetted	900	4		lower Eutaw	Dom. and stock	Preliminary analysis.
5	About 1.2 miles west of railroad at Panola.	R. C. Oliver	Jetted	650	4	650	middle Eutaw	Dom. and stock	Preliminary analysis.
11	Gainesville, Warsaw, Epes roads junction.	Town of Gainesville	Jetted	700	4		lower or middle Eutaw	Stock	Preliminary analysis.
13	Gainesville, .6 mile south of public square, east side of road.	John Rogers, Jr.	Jetted	630	3		middle Eutaw	Dom. and stock	Preliminary analysis.
14	Epes, town crossroads.	W. L. Willis and O. M. Cathey	Jetted	1000	3		lower Eutaw	Stock	Preliminary analysis.
15	Epes, just north of U.S. 11 at south end of town.	S. E. Smith	Jetted	820	4		middle Eutaw	Dom.	Preliminary analysis.
18	Coatopa-Belmont road, 1.1 mile east of Doughill Church, north of road.	Pete Prolio	Jetted	980	6		upper Eutaw	Stock	Preliminary analysis.

FLUORIDE IN GROUND WATER OF THE CRETACEOUS AREA OF ALABAMA

EXPLANATION

Numbers above circle refer to county number of well or spring; letters to left of circle refer to formation yielding the water: Pre-C = Pre Cambrian, T = Tuscaloosa, E = Eutaw, R = Ripley, B = Bluffstown, C = Gusseta, P = Providence.

- Well water containing less than 1.0
- Well water containing 1.0 to 1.9
- Well water containing 2.0 to 2.9
- Well water containing 3.0 to 3.9
- Well water containing more than 4.0

Parts per million fluoride

- Spring containing less than 1.0

LOCATION MAP

LAMAR
VERNON
FRISCO
Sulligent
SOUTHERN
Millport
Kennedy
PICKENS
Reform
Gordo
CARROLLTON
Pickensville
Aliceville
River
Sipsey
Dancy
Panola
West Greene
Warsaw
Clinton
Geiger
Mt. Hebron
GREENE
Gainesville
Akron
Moundville
TUTAW
Boligee
GREENSBORO
Forkland
HALE
PERRY
MARION
Sprott
Hamburg
Selma
Newbern
SUMTER
LIVINGSTON
DEMOPOLIS
Prairieville
Coatopa
Faunsdale
Uniontown
Brownsville
Marion Junction
DALLAS
Orrville
Safford
LINDEN
MARENGO
Richmond
Braggs
Maplesville
Plantersville
Billingsley
CHILTON
COOSA RIVER
TALLAPOOSA
AUTAUGA
Autaugaville
PRATTVILLE
ELMORE
Wetumpka
MONTGOMERY
Lowndesboro
Benton
HAYNEVILLE
LOWNDES
Letohatchee
Ft. Deposit
Jemison
Thorsby
Clanton
Verbena
Alabaster
Helena
Montevallo
Columbiana
Harpersville
Vincent
Sterrett
Shelby
Wilsonville
Calera
Saginaw
Alabama City
Gadsden
Attalla
Hokes Bluff
Rainbow City
Boaz
Albertville
Guntersville
Arab
Cullman
Hanceville
Fairview
Decatur
Hartselle
Somerville
Danville
Moulton
Courtland
Russellville
Phil Campbell
Sheffield
Tuscumbia
Florence
Muscle Shoals
Red Bay
Tishomingo
Iuka
Corinth
Burnsville
Rienzi
Booneville
Baldwin
Fulton
Smithville
Nettleton
Shannon
Plantersville
Verona
Mantachie
Tupelo
Saltillo
Pontotoc
Ecru
New Albany
Ripley
Blue Mountain
Falkner
Ashland
Holly Springs
Potts Camp
Byhalia
Hernando
Coldwater
Senatobia
Sardis
Batesville
Oxford
Water Valley
Grenada
Coffeeville
Duck Hill
Winona
Kilmichael
Durant
Lexington
Tchula
Yazoo City
Benton
Canton
Madison
Flora
Vicksburg
Jackson
Clinton
Raymond
Utica
Crystal Springs
Hazlehurst
Gallman
Port Gibson
Fayette
Natchez
Meadville
Brookhaven
Bude
McComb
Magnolia
Summit
Liberty
Centreville
Woodville
Wesson
Hazlehurst
Collins
Mt. Olive
Laurel
Ellisville
Heidelberg
Moselle
Sandersville
Waynesboro
Quitman
Enterprise
Meridian
Marion
Lauderdale
Philadelphia
Union
Newton
Decatur
Forest
Scott
Hillsboro
Morton
Carthage
Pelahatchie
Brandon
Florence
Pearl
Richland
Star
Mendenhall
Magee
Mt. Olive
Collins
Prentiss
Bassfield
Jones
Soso
Ellisville
Laurel